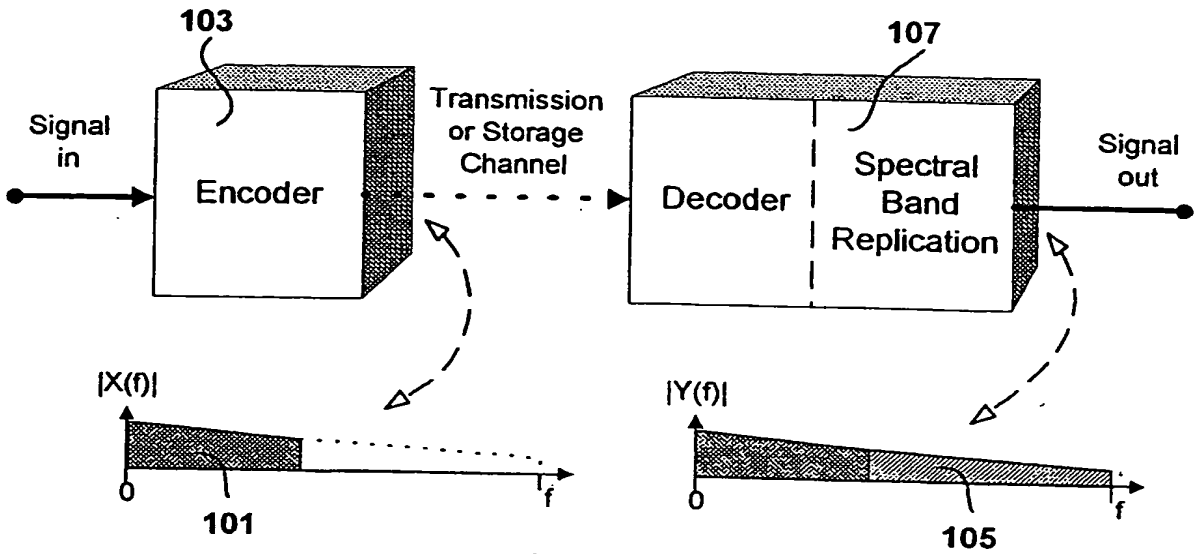
103
107
Signal in
Encoder
Transmission or Storage Channel
Decoder
Spectral Band Replication
Signal out
|X(f)|
0
f
101
|Y(f)|
0
f
105

Fig. 1

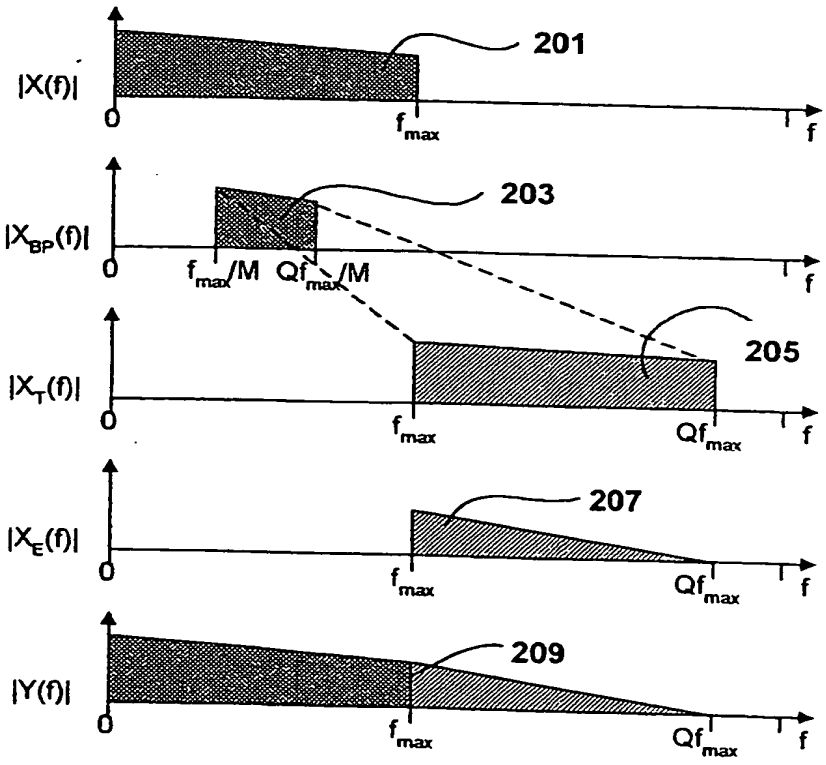
201
|X(f)|
0
f_{max}
f
203
$|X_{BP}(f)|$
0
f_{max}/M
Qf_{max}/M
f
205
$|X_T(f)|$
0
f_{max}
Qf_{max}
f
207
$|X_E(f)|$
0
f_{max}
Qf_{max}
f
209
|Y(f)|
0
f_{max}
Qf_{max}
f

Fig. 2

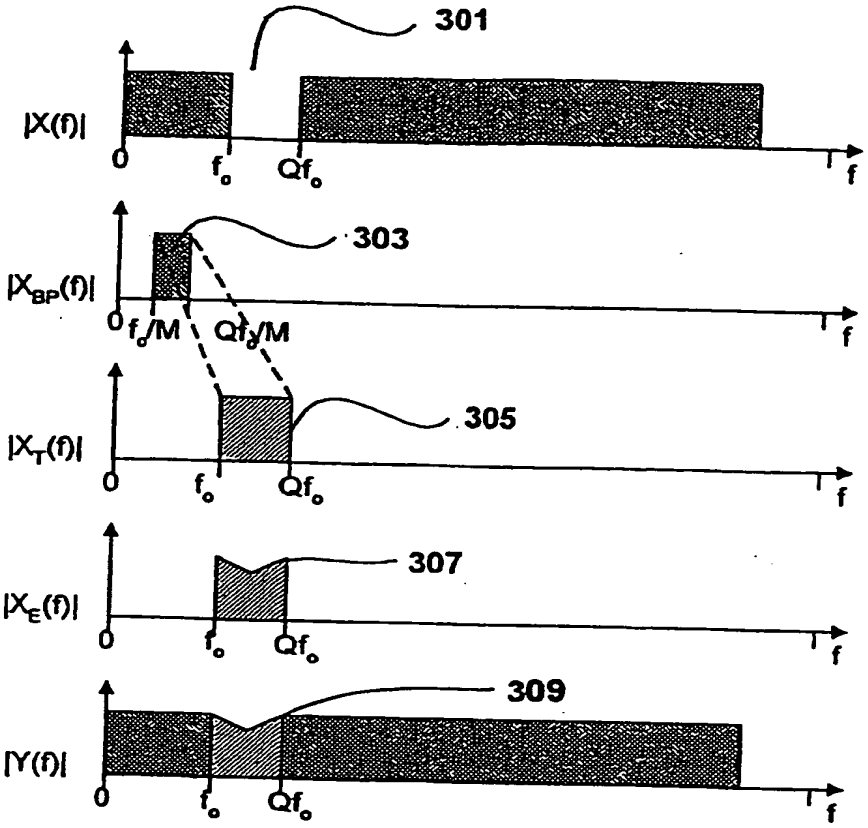
301
|X(f)|
0
f_o
Qf_o
f
303
$|X_{BP}(f)|$
f_o/M
Qf_o/M
305
$|X_T(f)|$
307
$|X_E(f)|$
309
|Y(f)|

Fig. 3

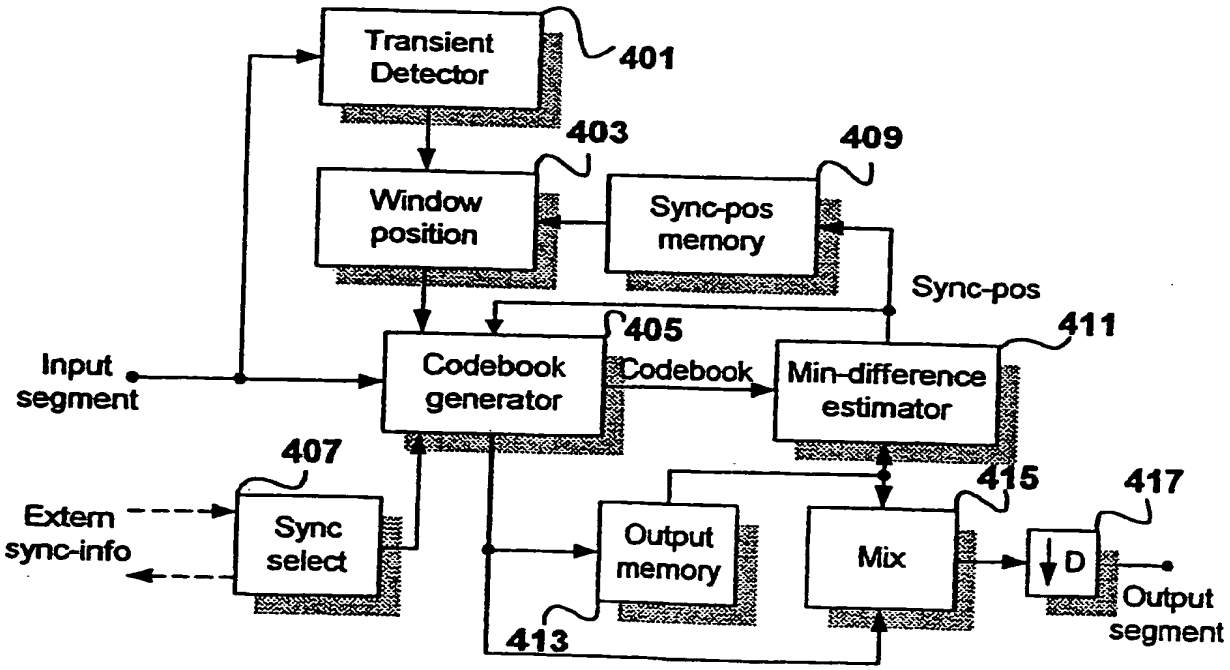
Transient Detector
401
403
Window position
409
Sync-pos memory
Sync-pos
405
Codebook generator
Codebook
411
Min-difference estimator
Input segment
407
Extern sync-info
Sync select
Output memory
413
415
Mix
417
D
Output segment

Fig. 4

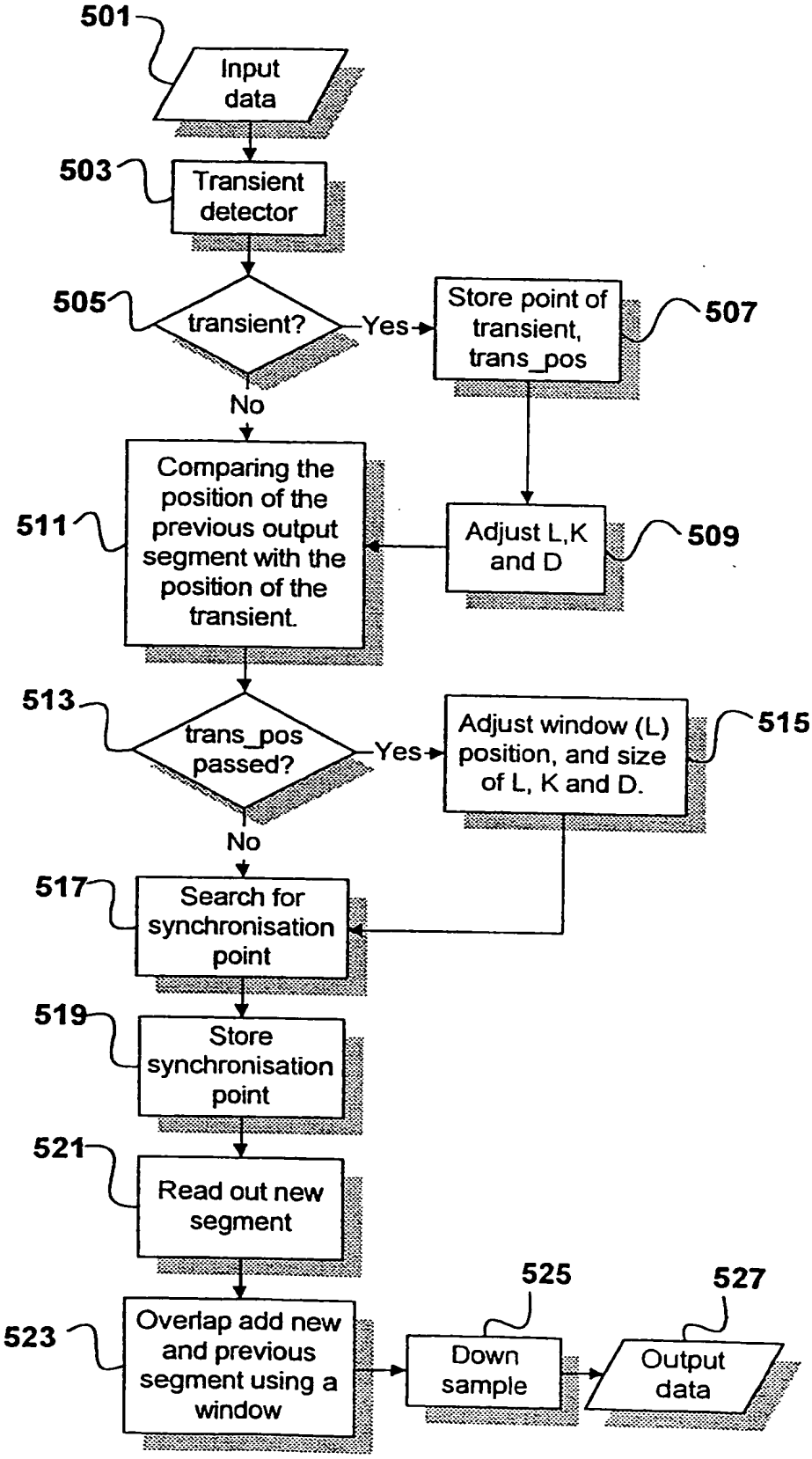
501
Input data
503
Transient detector
505
transient?
Yes
Store point of transient, trans_pos
507
No
Comparing the position of the previous output segment with the position of the transient.
511
Adjust L,K and D
509
513
trans_pos passed?
Yes
Adjust window (L) position, and size of L, K and D.
515
No
517
Search for synchronisation point
519
Store synchronisation point
521
Read out new segment
525
527
523
Overlap add new and previous segment using a window
Down sample
Output data

Fig. 5

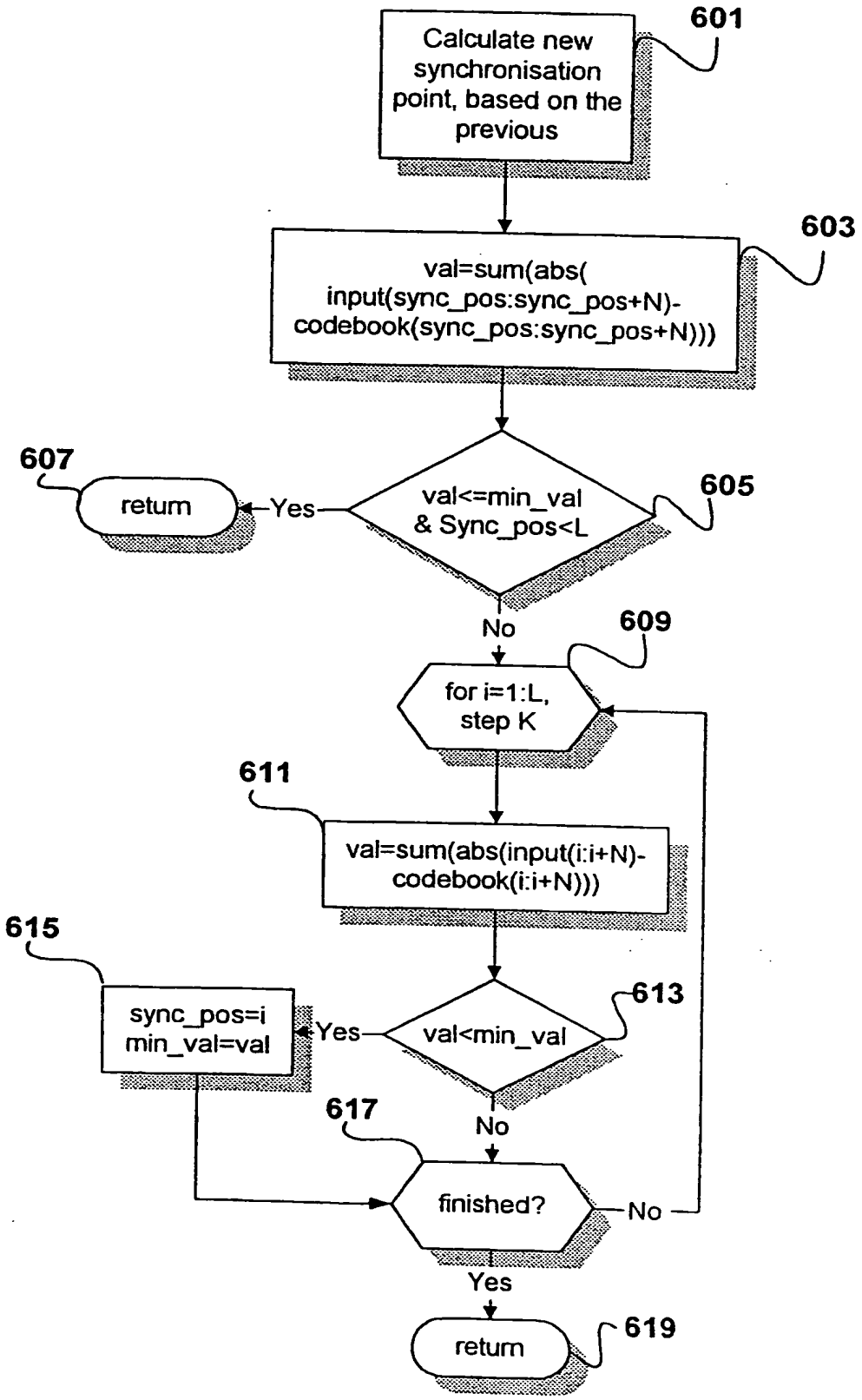
601
Calculate new synchronisation point, based on the previous
603
val=sum(abs(input(sync_pos:sync_pos+N)- codebook(sync_pos:sync_pos+N)))
605
val<=min_val & Sync_pos<L
Yes
607
return
No
609
for i=1:L, step K
611
val=sum(abs(input(i:i+N)- codebook(i:i+N)))
613
val<min_val
Yes
615
sync_pos=i min_val=val
No
617
finished?
No
Yes
619
return

Fig. 6

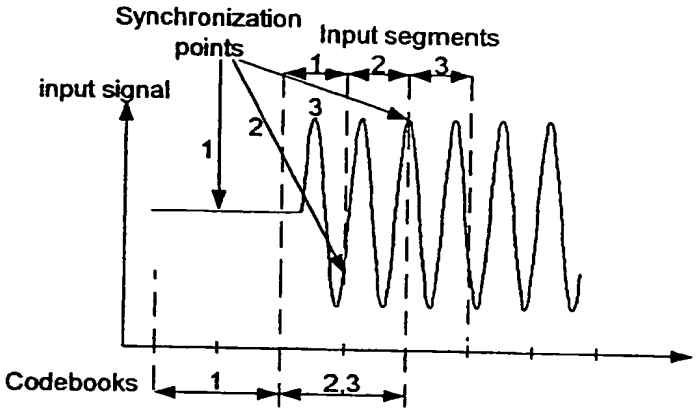

Fig. 7a

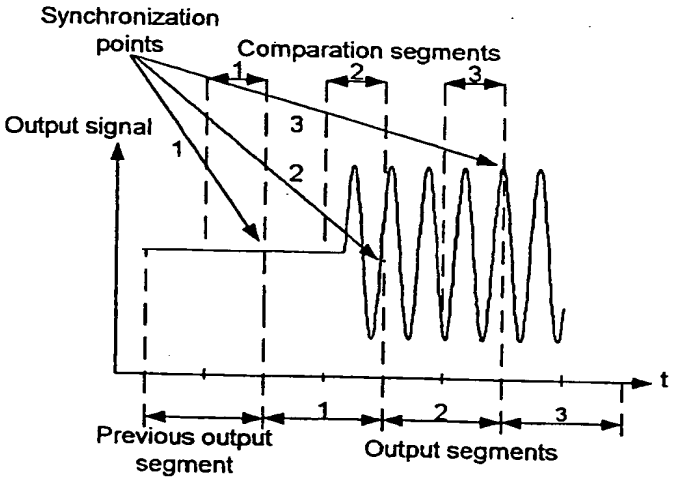

Fig. 7b

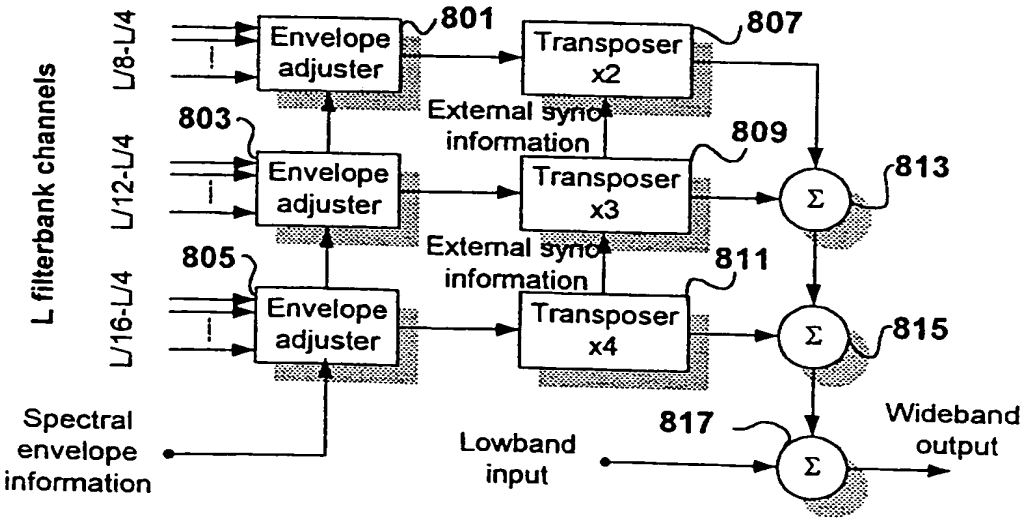

Fig. 8

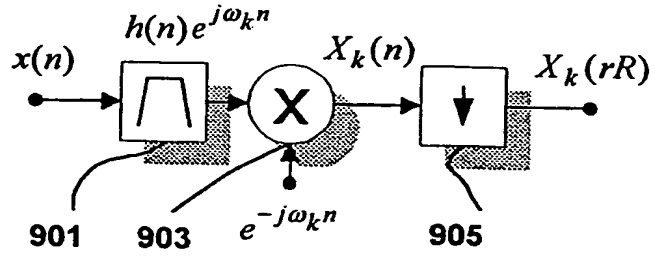

Fig. 9a

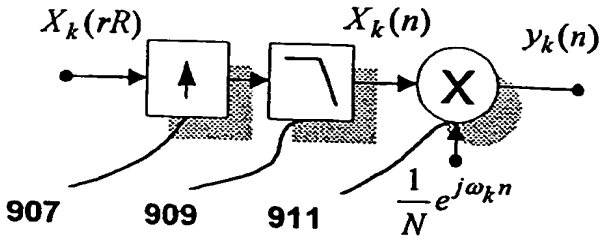

Fig. 9b

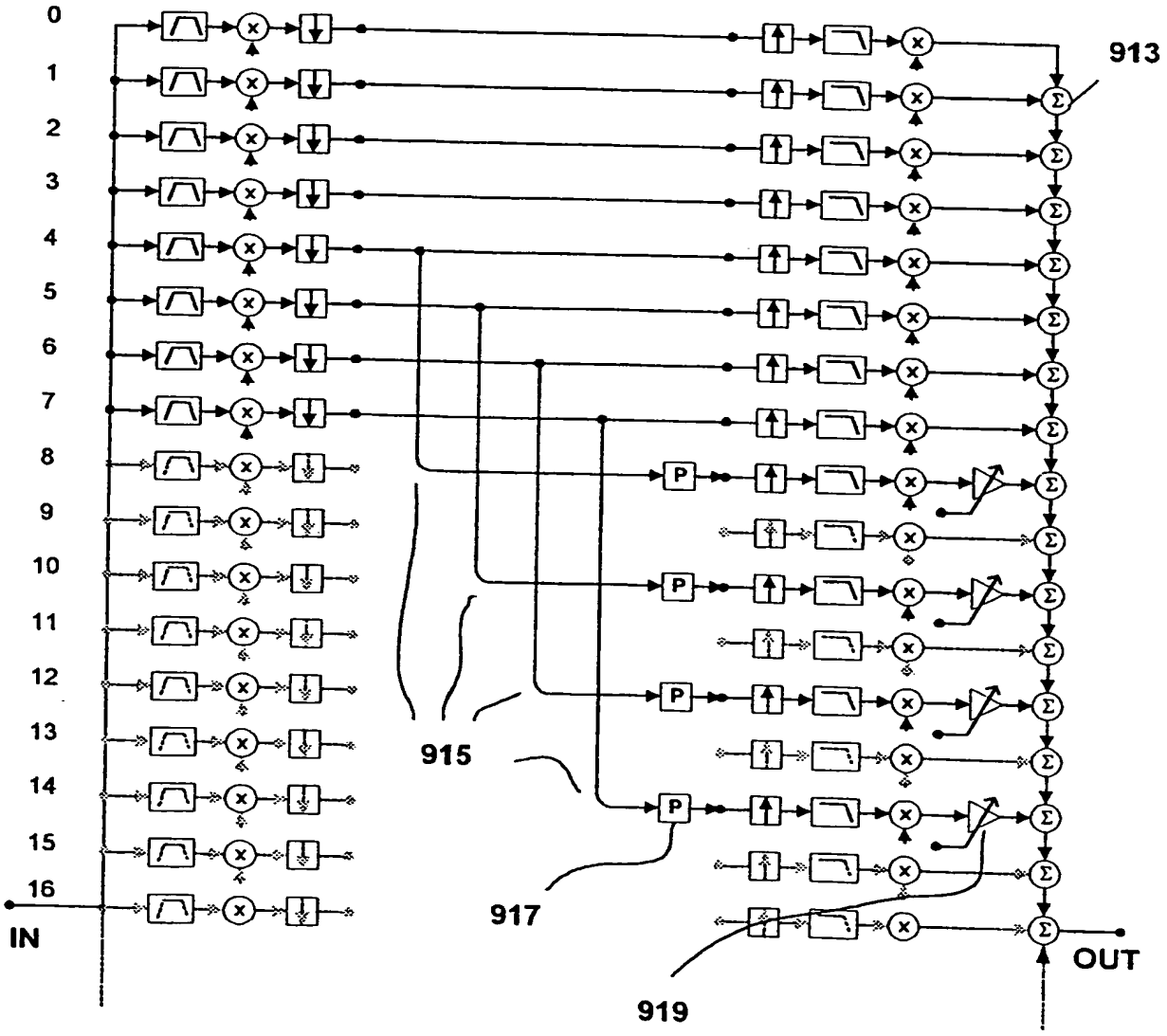

Fig. 9c

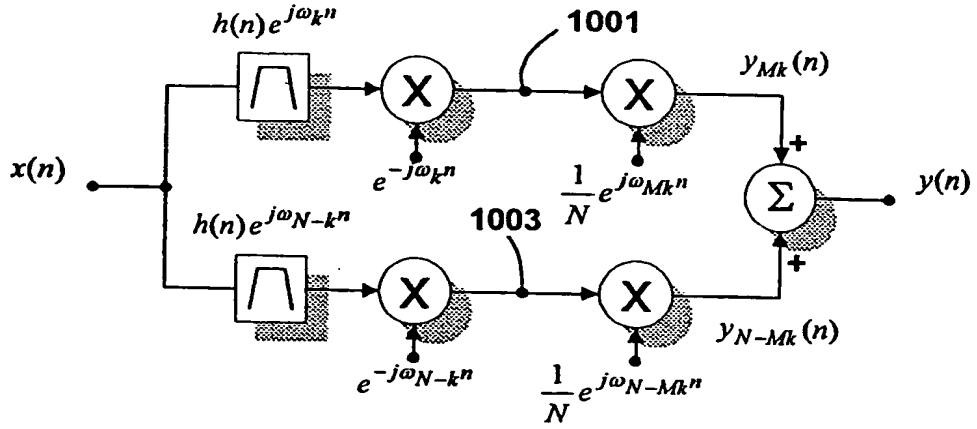

Fig. 10a

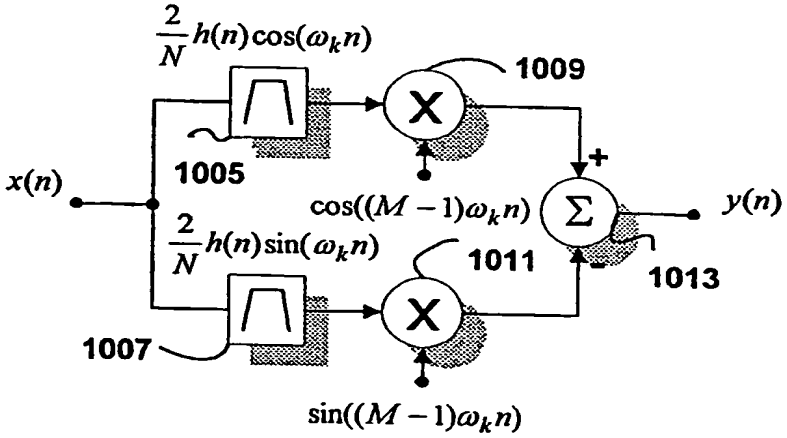

Fig. 10b

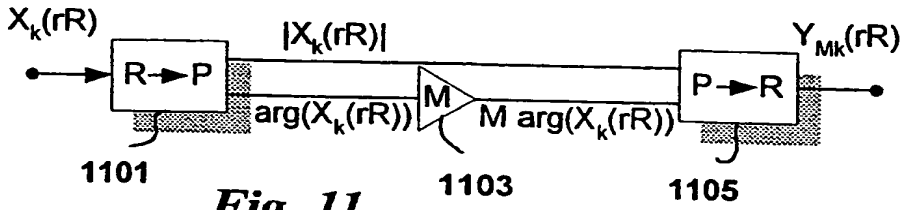

Fig. 11

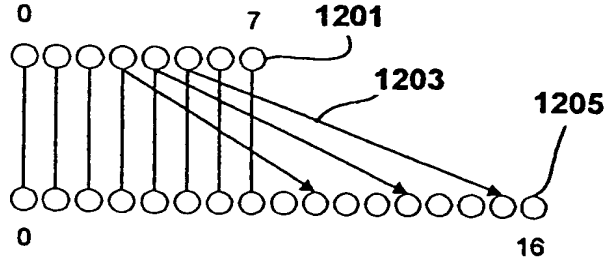

Fig. 12

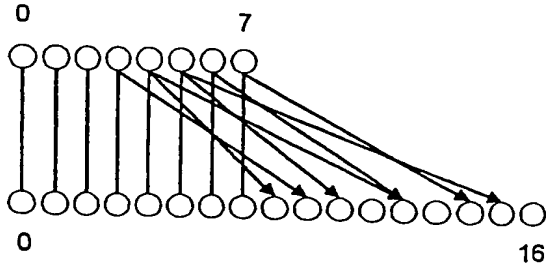

Fig. 13

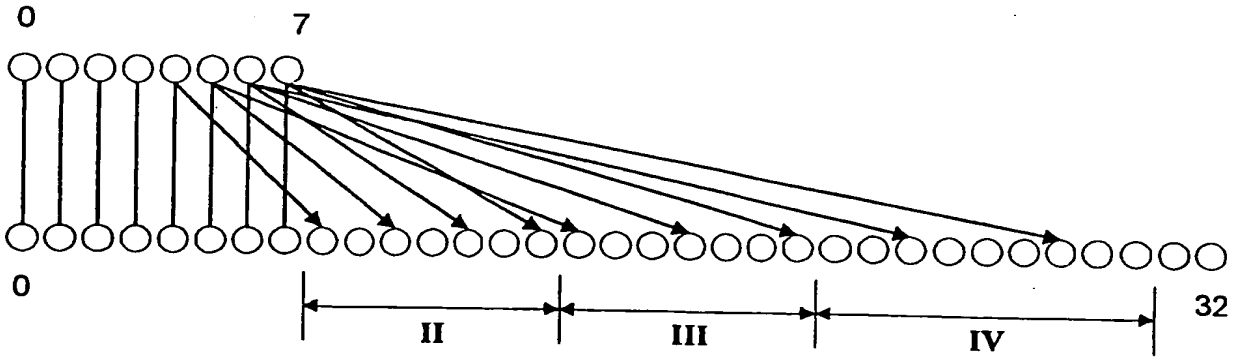

Fig. 14

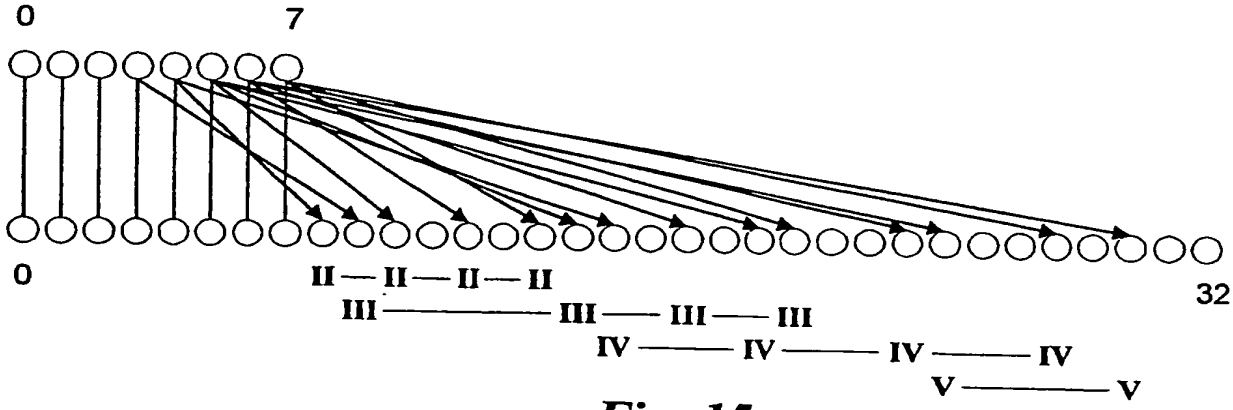

Fig. 15

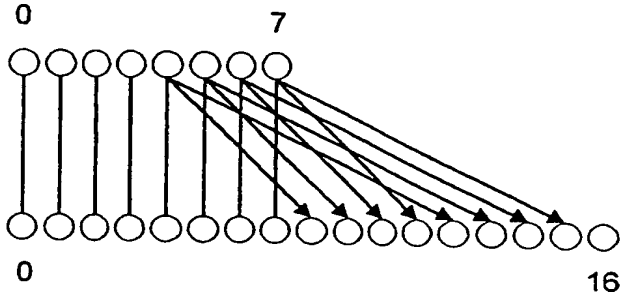

Fig. 16

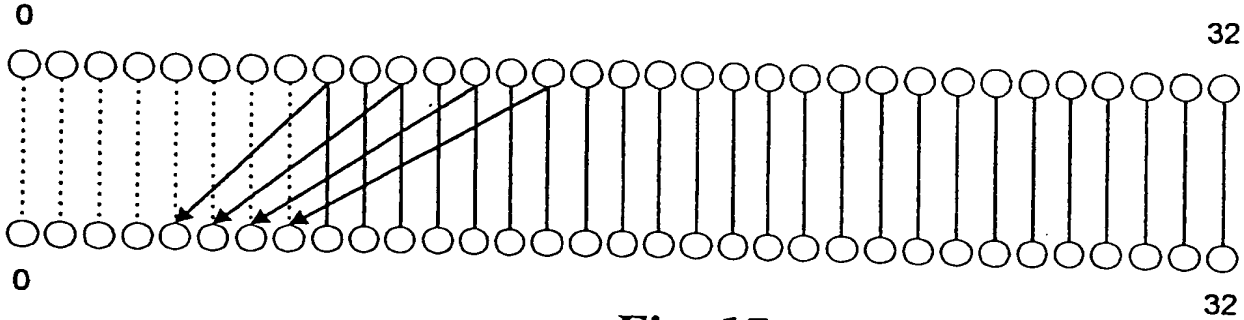

Fig. 17

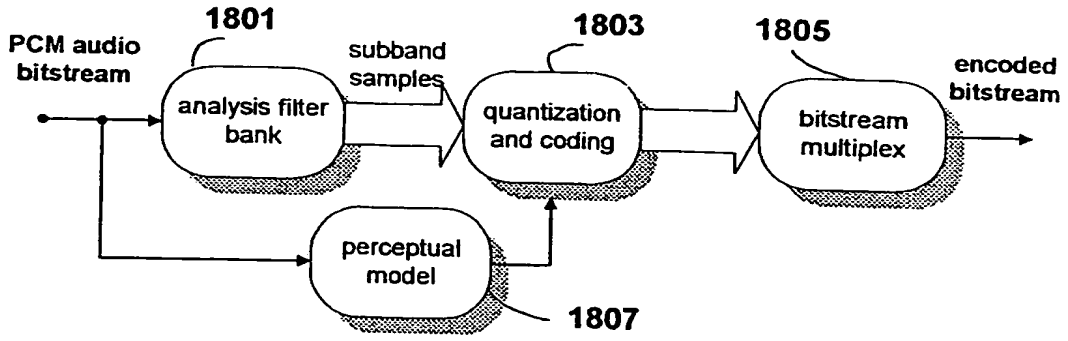

Fig. 18a

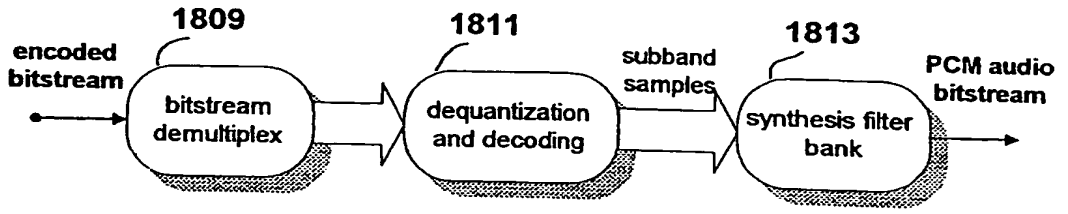

Fig. 18b

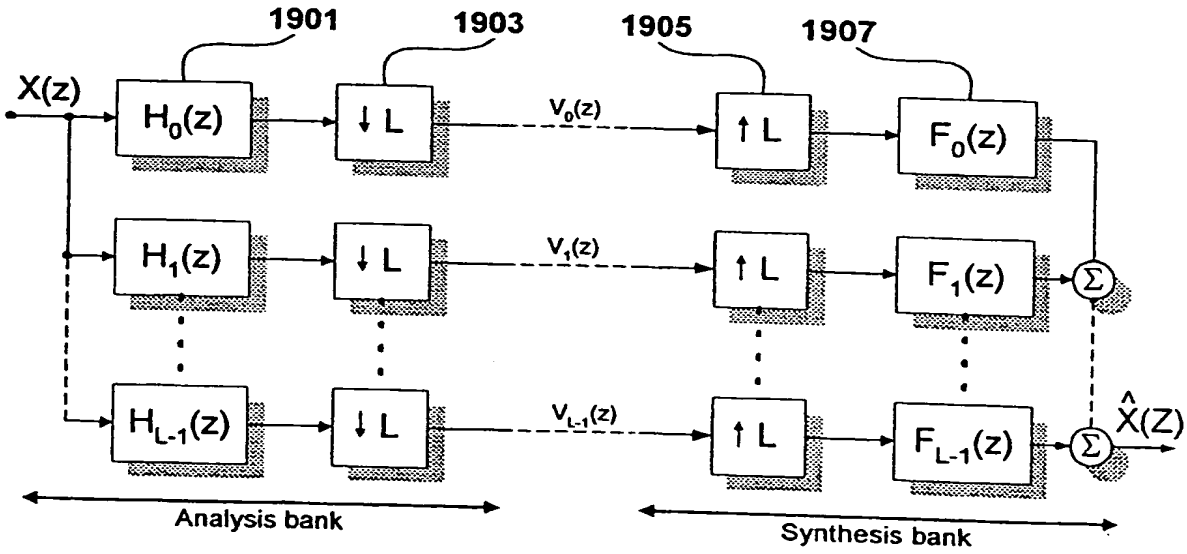

Fig. 19

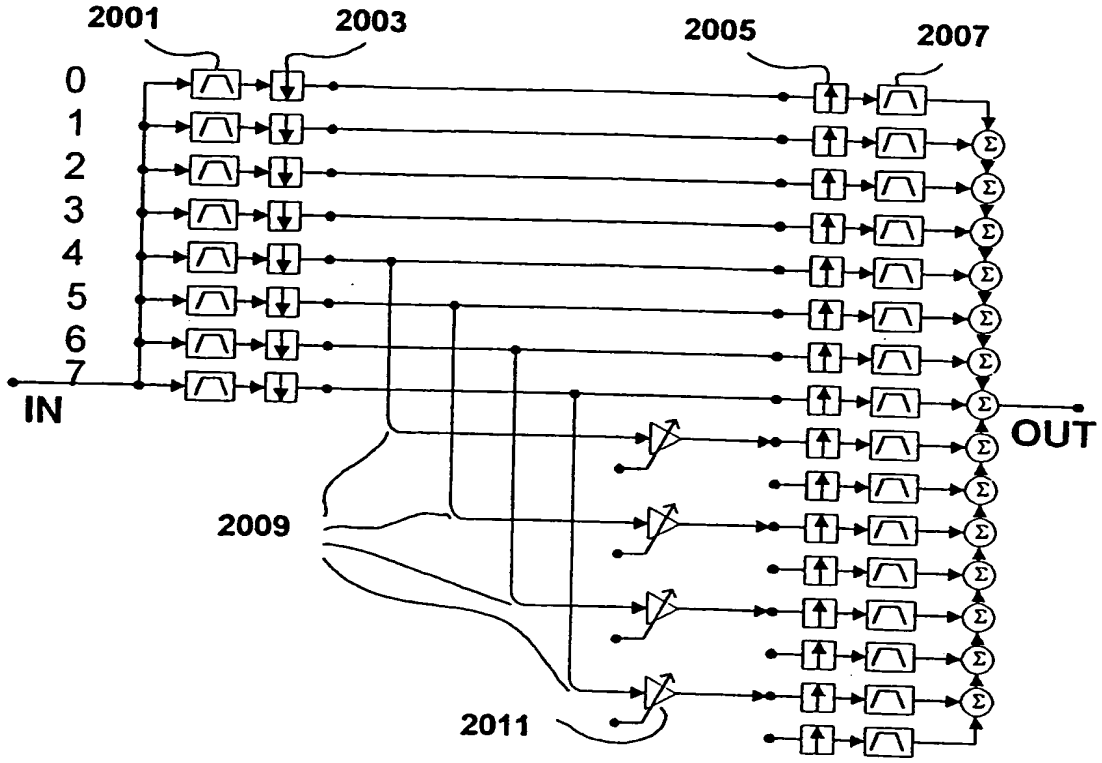
2001
2003
2005
2007
0
1
2
3
4
5
6
7
IN
OUT
2009
2011

Fig. 20

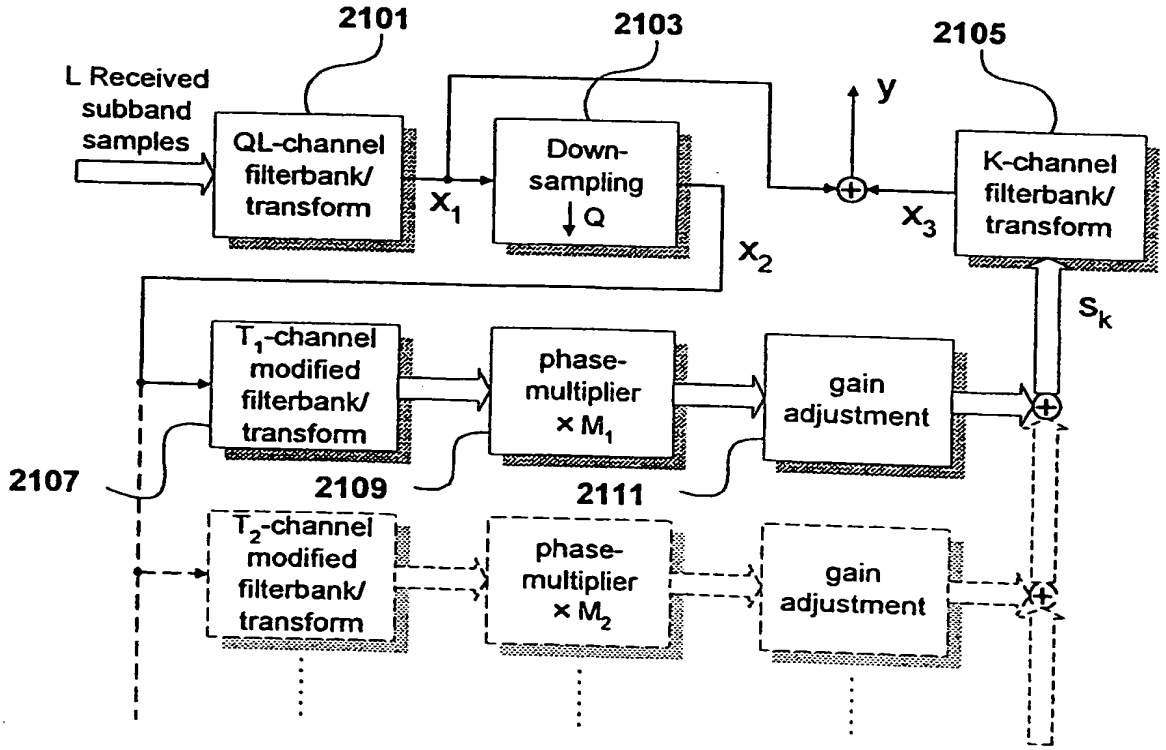
2101
2103
2105
L Received subband samples
QL-channel filterbank/ transform
Down-sampling ↓Q
y
K-channel filterbank/ transform
x_1
x_2
x_3
S_k
T_1-channel modified filterbank/ transform
phase-multiplier $\times M_1$
gain adjustment
2107
2109
2111
T_2-channel modified filterbank/ transform
phase-multiplier $\times M_2$
gain adjustment

Fig. 21

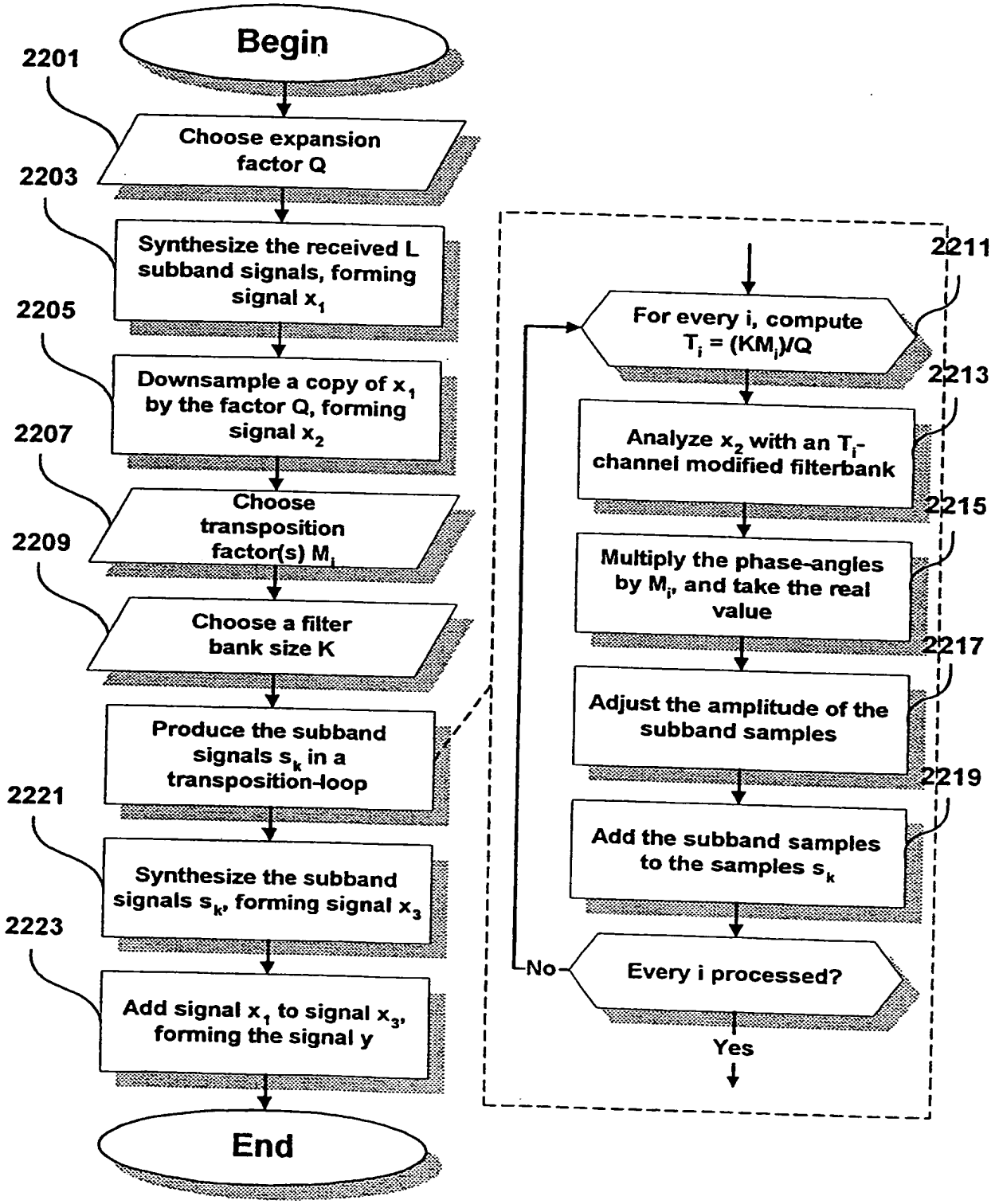
Begin
2201
Choose expansion factor Q
2203
Synthesize the received L subband signals, forming signal x_1
2205
Downsample a copy of x_1 by the factor Q, forming signal x_2
2207
Choose transposition factor(s) M_i
2209
Choose a filter bank size K
Produce the subband signals s_k in a transposition-loop
2221
Synthesize the subband signals s_k, forming signal x_3
2223
Add signal x_1 to signal x_3, forming the signal y
End
2211
For every i, compute $T_i = (KM_i)/Q$
2213
Analyze x_2 with an T_i-channel modified filterbank
2215
Multiply the phase-angles by M_i, and take the real value
2217
Adjust the amplitude of the subband samples
2219
Add the subband samples to the samples s_k
Every i processed?
No
Yes

Fig. 22

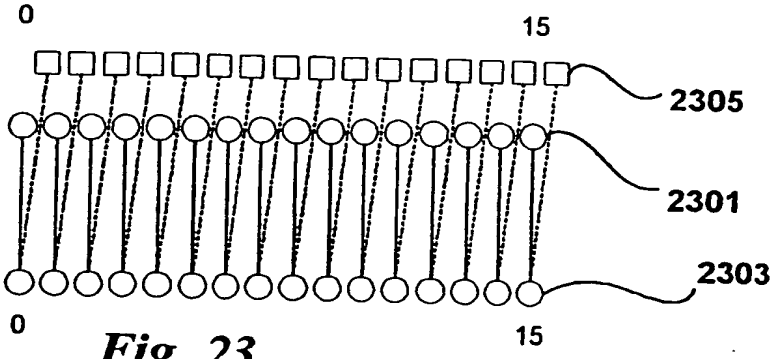

Fig. 23

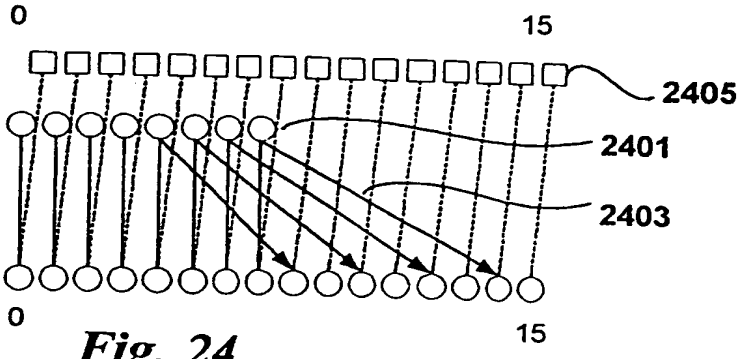

Fig. 24

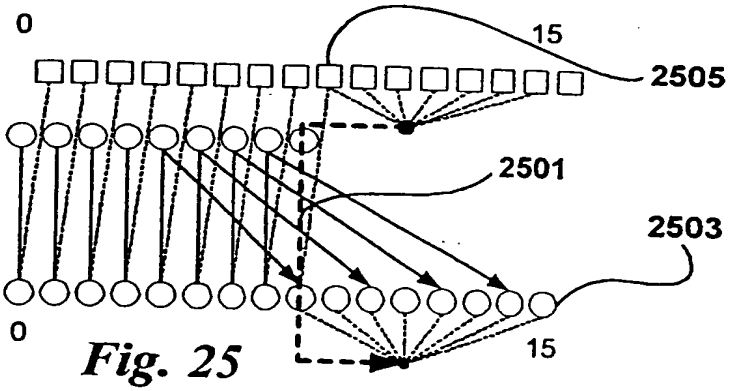

Fig. 25

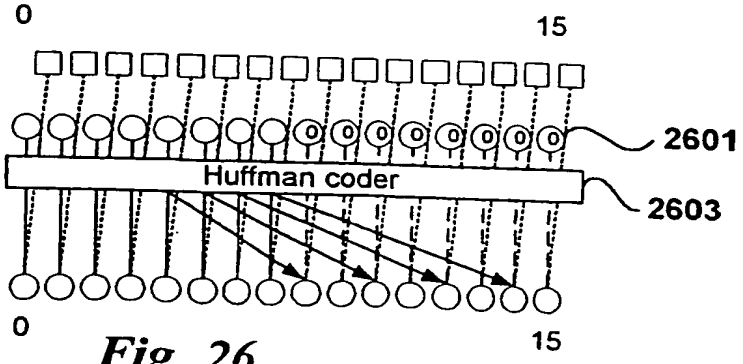

Fig. 26

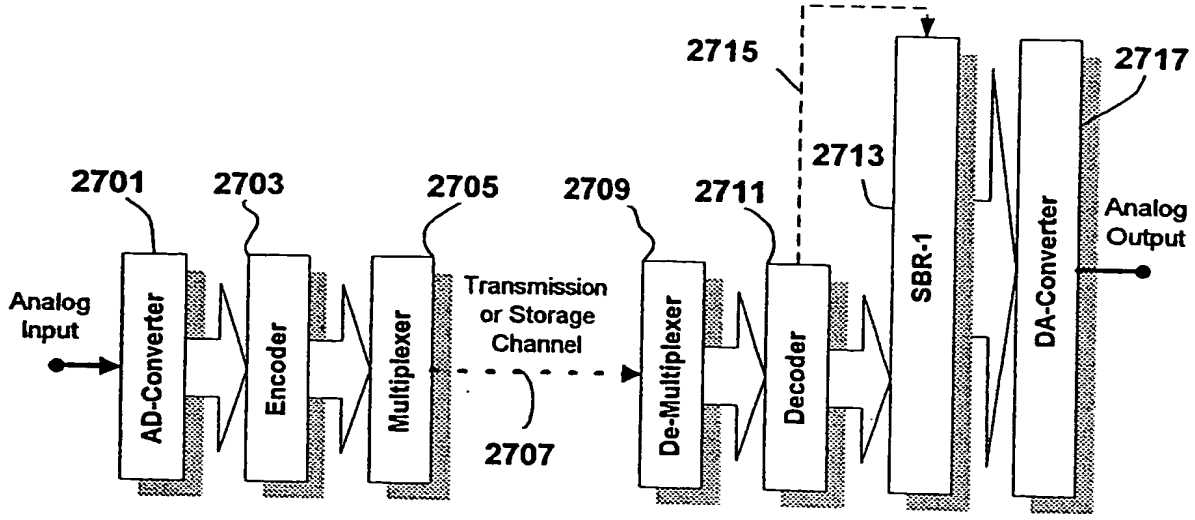

Fig. 27

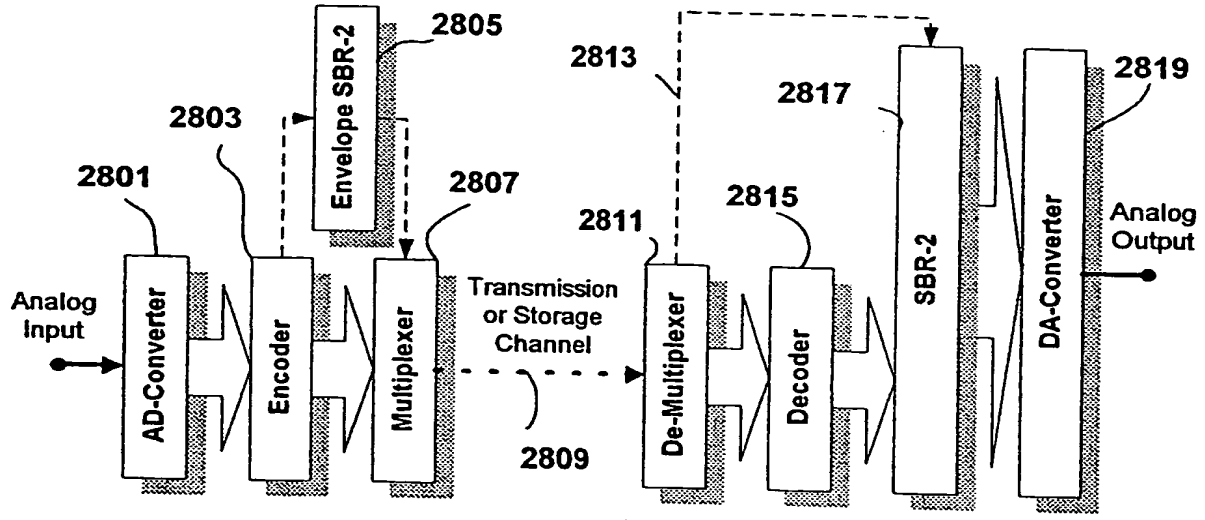

Fig. 28

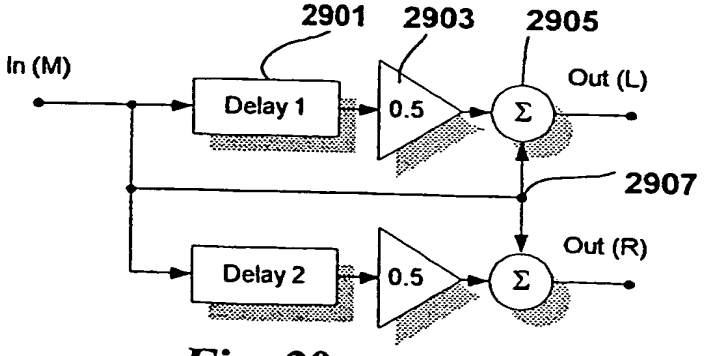

Fig. 29